

WHAT IS CLAIMED IS:

1 1. A method of manufacturing a field emission device, the method comprising:

2 preparing a substrate structure, the substrate structure comprising a substrate, a cathode
3 electrode formed on the substrate, a gate insulating layer formed on the cathode electrode, the gate
4 insulating layer being perforated by gate insulating holes that expose portions of the cathode
5 electrode, and a gate electrode being perforated by gate holes that correspond to the gate insulating
6 holes, the cathode electrode, the gate insulating layer, and the gate electrode being sequentially
7 stacked on the substrate;

8 forming a sacrificial layer on a surface of the substrate structure excluding the exposed
9 portions of the cathode electrode, which are exposed by the holes, the sacrificial layer being present
10 on inner side walls of the holes;

11 forming an isolation layer on the sacrificial layer, the isolation layer adapted to prevent
12 electron emission materials adapted to form emitters from coming into contact with the sacrificial
13 layer;

14 forming an electron emission material layer by depositing the emission electron materials on
15 the surface of the substrate structure where the isolation layer is formed, the electron emission
16 material layer filling the holes;

17 removing the isolation layer and the electron emission materials, which are formed on the
18 sacrificial layer, and forming the emitters inside the holes using the electron emission material layer
19 by performing a lift-off process using an etchant, the lift-off process for removing the sacrificial layer
20 that is formed on the surface of the gate electrode and the inner walls of the holes; and

21 firing the emitters.

1 2. The method of claim 1, the electron emission materials being comprised of a material
2 selected from the group consisting of carbon nanotubes and nanoparticles.

1 3. The method of claim 1, the electron emission materials comprising an electrically
2 conductive material.

1 4. The method of claim 3, the electron emission materials comprising Ag.

1 5. The method of claim 1, the isolation layer being comprised of an electrically resistive
2 material.

1 6. The method of claim 5, the isolation layer being comprised of a material selected from
2 the group consisting of SiO_2 , MgO , a-Si, and p-Si.

1 7. The method of claim 1, upon application, the isolation layer comprising a material being
2 selected from the group consisting of a paste, a sol-gel and a slurry solution.

1 8. The method of claim 1, the electron emission materials comprising a conductive material
2 selected from the group consisting of a paste, a sol-gel and a slurry solution.

1 9. The method of claim 8, the electron emission material comprising Ag.

1 10. The method of claim 1, wherein the electron emission material layer and the sacrificial
2 layer each comprise photoresist.

1 11. The method of claim 1, the isolation layer being formed using an IPA/H₂O solution
2 comprising polyvinyl alcohol.

1 12. The method of claim 1, the electron emission material comprising a binder.

1 13. The method of claim 3, the electron emission material further comprising a binder.

1 14. The method of claim 1, the sacrificial layer being patterned and not being blanket